

Arizona Department of Water Resources

Arizona Colorado River Shortage Sharing

602(a) Storage

for

Upper Colorado River Basin Reservoirs

Arizona Colorado River Shortage Sharing

602(a) Storage

- * 602(a) Storage and concept of “Equalization” introduced in the Colorado Basin Project Act of 1968 in Section 602(a).**
- * Storage in Upper Basin reservoirs necessary to assure deliveries to the Lower Basin without impairment to consumptive uses in the Upper Basin.**
- * “Equalization” releases to Lake Mead are not required in years when the Upper Basin storage is less than the 602(a) storage.**
- * Active storage of Lake Powell, Flaming, Navajo, and Blue Mesa reservoirs can be used.**

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602(a) Storage

*** Colorado River Basin Project Act - 1968**

■ Section 602(a)

...releases to comply with article III(d) of the Colorado River Compact, less such quantities of water delivered into the Colorado River below Lee Ferry to the credit of the States of the Upper Division from other sources; and

(3) storage of water not required for the releases specified in clauses (1) and (2) of this subsection to the extent that the Secretary, after consultation with the Upper Colorado River Commission and representatives of the three Lower Division States and taking into consideration all relevant factors (including, but not limited to, historic stream flows, the most critical period of record, and probabilities of water supply), shall find this to be reasonably necessary to assure deliveries under clauses (1) and (2) without impairment of annual consumptive uses in the upper basin pursuant to the Colorado River Compact: *Provided*, That water not so required to be stored shall be released from Lake Powell: (i) to the extent it can be reasonably applied in the States of the Lower Division to the uses specified in article III(e) of the Colorado River Compact, but no such releases shall be made when the active storage in Lake Powell is less than the active storage in Lake Mead, (ii) to maintain, as nearly as practicable, active storage in Lake Mead equal to the active storage in Lake Powell, and (iii) to avoid anticipated spills from Lake Powell.

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602(a) Storage

*** Colorado River Basin Project Act - 1968**

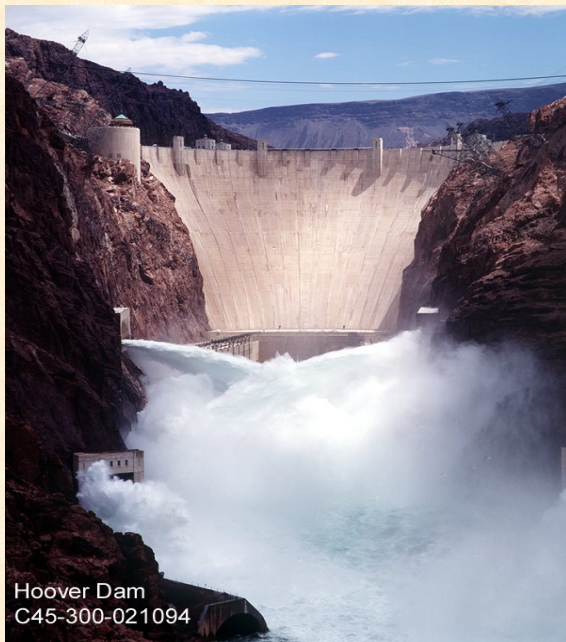
■ Section 602(a)

In order to comply with and carry out the provisions of the Colorado River Compact, the Upper Colorado River Basin Compact, and the Mexican Water Treaty, the Secretary shall propose criteria for the coordinated long-range operation of the reservoirs constructed and operated under the authority of the Colorado River Storage Project Act [43 U.S.C. 620 et seq.], the Boulder Canyon Project Act [43 U.S.C. 617 et seq.], and the Boulder Canyon Project Adjustment Act [43 U.S.C.A. ' 618 et seq.]. To effect in part the purposes expressed in this paragraph, the criteria shall make provision for the storage of water in storage units of the Colorado River storage project and releases of water from Lake Powell in the following listed order of priority:

(1) releases to supply one-half the deficiency described in article III(c) of the Colorado River Compact, if any such deficiency exists and is chargeable to the States of the Upper Division, but in any event such releases, if any, shall not be required in any year that the Secretary makes the determination and issues the proclamation specified in section 202 of this title;...

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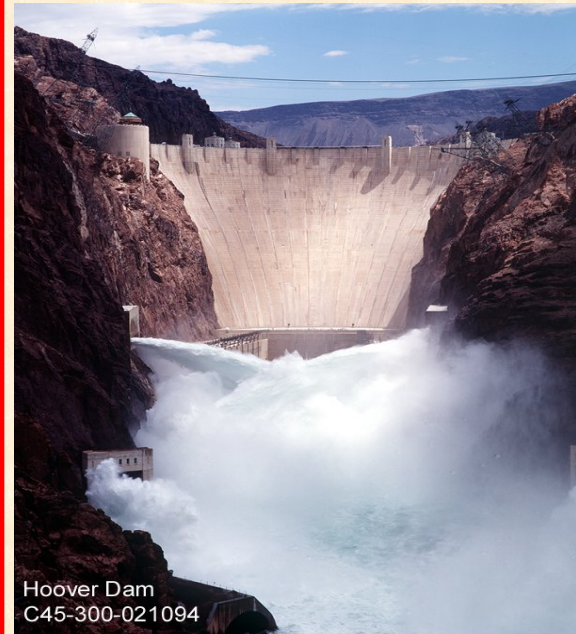
602(a) Storage



Hoover Dam
C45-300-021094

- ✧ Purpose of requirement is to ensure that the Upper Division states can meet Lower Division states' consumptive use needs.
- ✧ If the Upper Basin reservoir active storage forecast is less than the quantity required under Section 602(a) or the forecasted storage for Lake Powell is less than the forecasted storage for Lake Mead, then the minimum objective release is required, which currently is 8.23 MAF.
- ✧ If the forecasted Upper Basin storage is greater than the the required 602(a) storage, release greater than the minimum objective release can be made from Lake Powell if the water can be reasonably applied in the the Lower Division states to meet uses in the Colorado River Compact, or to equalize as closely as possible the storage in Lake Powell and Lake Mead, or to avoid spills from Lake Powell.
- ✧ In 2004, an interim 602(a) guideline has been adopted that ties the minimum objective release to a storage level in Lake Powell; the level is 14.85 MAF (3,630 feet).

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Hoover Dam
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Long Range Operating Criteria

- * Determine the projected operation of the Colorado River reservoirs to satisfy project purposes under varying hydrologic and climatic conditions
- * Determine “602(a)” storage requirement for Lake Powell [Article II(1)]
- * Minimum Objective Release from Lake Powell
- * Determine water available for delivery to Mexico
- * Determine *Normal, Surplus, or Shortage* conditions based on historic stream flows, the most critical period of record, and probabilities of water supply, estimated upper basin depletions, and upper basin system storage for for Lake Mead
- * Determine if any unapportioned water is available in the Lower Division states

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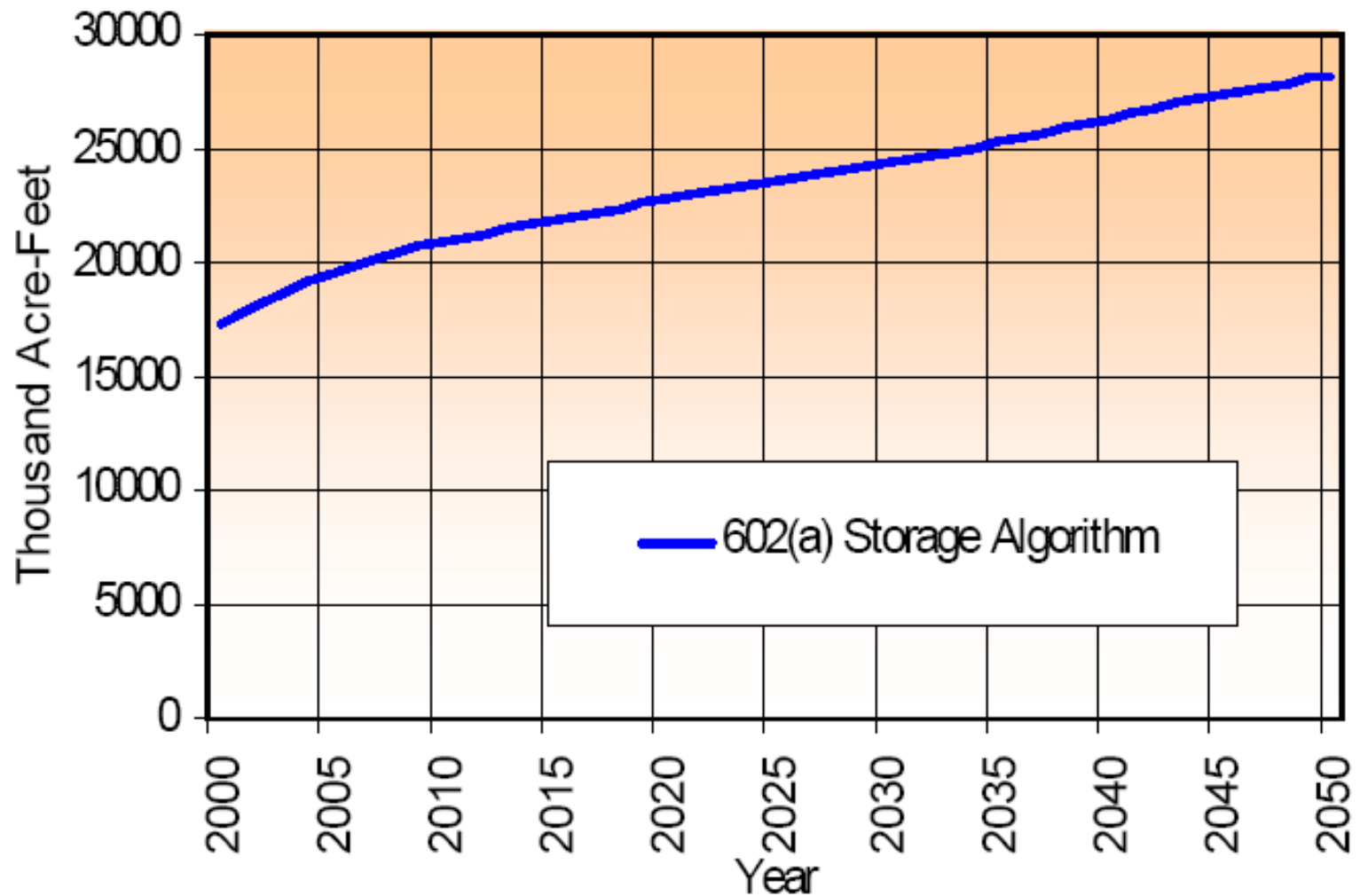
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Article II (1) of the Long Range Operating Criteria

- * Requires annual Secretarial determination of 602(a) storage.**

- * Relevant factors:**
 - Historic streamflows**
 - Critical period of record (1954 – 1964)**
 - Probabilities of water supply**
 - Future Upper Basin depletions, recurrence of Critical period**
 - Report of the Committee on Probabilities and Test Studies**

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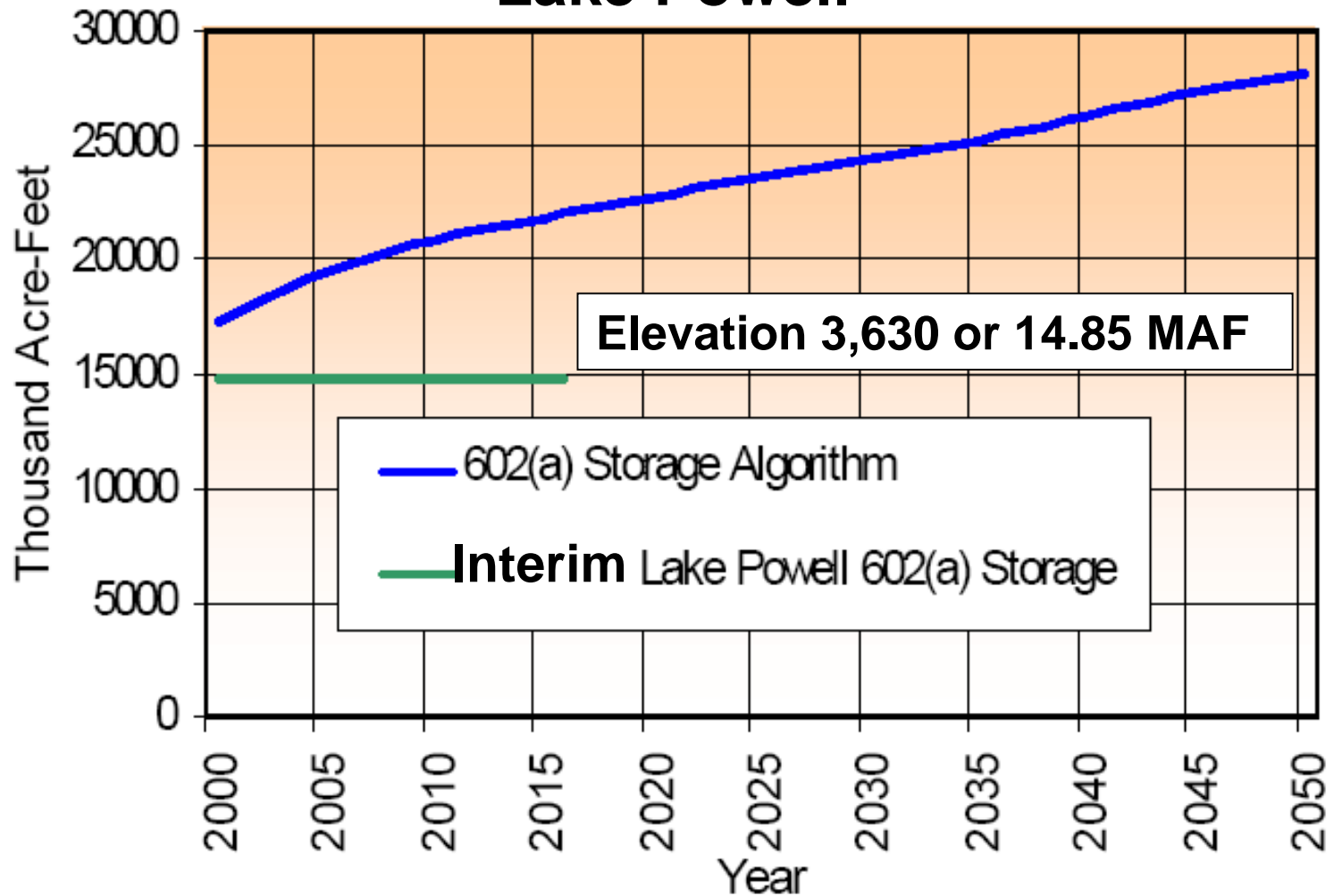
602(a) Storage - *Algorithm Used in Modeling*

✳ **602(a) Storage Requirement = {(Upper Basin Depletion + Upper Basin Evaporation) X (1 – Percent Shortage to Upper Basin Depletions / 100) + Minimum Objective Release - Critical Period Inflow} X12 + Minimum Upper Basin Power Pool Storage**

Where:

- **Upper Basin Depletion** - the average of the next 12 years of the Upper Basin scheduled depletions
- **Upper Basin Evaporation** - the average annual evaporation loss in the Upper Basin, which is currently 560,000 acre-feet
- **Percent Shortage to Upper Basin Depletions** - the percentage that will be applied Upper Basin depletions during the critical period (currently zero)
- **Minimum Objective Release** – the minimum objective release to the Lower Basin, the current release is 8.23 million acre-feet
- **Critical Period Inflow** – the average annual natural inflow into the Upper Basin during the critical period (1953-1964), currently set at 12.18 million acre-feet
- **Minimum Power Upper Basin Power Pool Storage** – the amount of minimum power pool to be preserved in the Upper Basin reservoirs, which is 5.179 million acre-feet

602(a) Storage Lake Powell



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602(a) Storage - Algorithm Used in Modeling

Example Calculation

If on September 30, 2004:

Flaming Gorge Storage	- 3,366,000 Acre-feet
Navajo Reservoir	- 872,000 Acre-feet
Blue Mesa Reservoir	- 680,000 Acre-feet
Lake Powell	- 14,630,000 Acre-feet
Projected Average Annual Upper Basin Depletion 2005 to 2106	- 4,581,000 Acre-feet

602(a) Storage Using Algorithm would be (in 1,000s acre-feet):

$$\begin{aligned} \text{602(a) Storage} &= \{(4,581 + 560) \times (1 - 0/100) + 8,230 - 12,180\} \times 12 \\ &\quad + 5,179 \\ &= 19,471 \end{aligned}$$

$$\begin{aligned} \text{Combined Upper Basin Storage} &= 3,366 + 872 + 680 + 14,630 \\ &= 19,548 \end{aligned}$$

Result - Equalization under original algorithm
- No equalization under Interim Guideline because
Lake Powell's Storage is less than 14,850,000 acre-feet